to priority were in the end completely established. The machine may be seen amongst the historical apparatus at the South Kensington Museum. His other inventions included a lightning protector for telegraph lines and cables, a polarised needle telegraph instrument, and the time-ball as now used at Greenwich Observatory and elsewhere.

Mr. Varley, following Lord Kelvin, contributed a highly useful paper, in 1858, to the Institution of Civil Engineers on the electrical qualifications requisite in long submarine telegraph cables, as well as another on the same subject to the Society of Arts. In setting forth here the true electrical qualifications for the working of a submarine cable, he showed in a very convincing way that conductor resistance was as much a factor in retardation as induction. He was the son of a famous artist, Cornelius Varley, and was one of a famous family of electricians. C. B.

IT is with much regret that we have to record the death of M. JULES CARPENTIER on June 29. M. Carpentier was born in 1851, and received his education at the Ecole Polytechnique. In 1876 he entered the service of the Paris-Lyons-Marseilles railway as assistant constructional engineer, and would probably have developed his genius for machine construction in the service of the railway had not the death of Ruhmkorff directed his attention to the design of electrical apparatus. He took over Ruhmkorff's workshops, reorganised them, and commenced to manufacture standard electrical apparatus suitable for the measurement of the heavy currents necessary for the application of electricity to industry. Amperemeters, voltmeters, electrodynamometers, and other apparatus associated with the names of d'Arsonval, Marcel Deprez, and Baudot were in a large measure developed and made practical instruments by the genius of Carpentier. His activities did not end with electrical instrument-making, for his name is also associated with three-colour photography, while during the war his workshops turned out a number of periscopes for use on submarines. M. Carpentier was elected a free member of the Paris Academy of Sciences in 1907, where he represented the mechanical arts and the manufacture of instruments of precision.

THE death occurred on August 13, at the age of sixty-five years, of SIR ALFRED W. W. DALE, late vice-chancellor of the University of Liverpool. Sir Alfred was educated at King Edward's School, Birmingham, and Trinity Hall, Cambridge. For twenty years he was lecturer, bursar, and tutor of his old college, during which time he established for himself a reputation as an able administrator of university affairs, as well as a classical scholar. In 1899 he was appointed principal of University College, Liverpool, and when Victoria University was dissolved in 1903, and its separate colleges assumed university rank, he became the first vice-chancellor of Liverpool University, retaining this post until 1919, when he was succeeded by Dr. J. G. Adami.

Notes.

THE local secretaries of the British Association for the Edinburgh meeting desire to contradict the statement which appears to be current in some quarters that the hotels and boarding-houses of Edinburgh are fully booked for the period of the meeting. There is plenty of accommodation vacant in certain hotels, in boarding-houses, and in apartments; and in one of the hostels—a modern hall of residence—fifty places are still available for the accommodation of members. The Secretary for Hotels and Lodgings, the University, Edinburgh, will be glad to answer inquiries. Members who write to hotels and boarding-houses direct should enclose a stamped addressed envelope for reply.

THE outbreak of smallpox in Nottingham is at present kept within bounds by the incessant work of the medical and civic authorities. The trouble is that Nottingham has been for some years a hunting-ground of "anti" people. Still, we may be fairly sure that Nottingham will not suffer the fate of Gloucester, where 279 unvaccinated children died of smallpox in 1895–96. But there is always this difficulty, that vaccination in early childhood, though it may fail to give complete protection against smallpox some years later, may so modify the attack that the case is mistaken for chicken-pox. This mistake must be reckoned as well-nigh inevitable, now that smallpox is so rare that many doctors have never seen a case of it. The annual report (1920) of the Scottish Board of Health contains a good summary of the Glasgow epidemic last year. It is the old story: that the general neglect of vaccination in childhood is bringing about a reversion to the original habits of the disease. Smallpox naturally prefers children under ten years of age: and now it gets them. Of course we all know that vaccination is not a perfect method; we all hope for a perfect method; we all would like to get rid of the calf, to be able to use a non-living vaccine, exactly standardised; a hypodermic dose, and no scratching of the skin. Some day, surely, this perfect method will be worked out. Meanwhile we all know what would happen if it were possible to take a school of 200 small children, to vaccinate 100, to leave 100 unvaccinated, and then to expose the whole school to smallpox. Even the anti-vaccinationists know what would happen. The present writer put this view of the disease to one of them, and he answered that God would interfere in favour of the unvaccinated children: a fool's answer. Two cases of smallpox have just occurred in Huddersfield (*Times*, August 11). Let us hope that vaccination of contacts, quarantine, and other sanitary measures will prevent the spread of infection. Probably we shall have other outbreaks of the disease this autumn and winter.

It is the intention of the Rockefeller Foundation to publish from time to time a circular of information reviewing its activities, and the first number was issued on July 25. A million francs was voted towards the endowment of La Fondation Reine Elisabeth, a new institution for medical research established in connection with a hospital in the suburbs of Brussels, while three million dollars have also been allocated to the Brussels authorities for medical education. Reference is also made to the grants of five million dollars each to Canada and to University College and Hospital in 1919 for medical education. Support has been given to several medical schools in the United States, contributions have been made towards campaigns against malaria, yellow fever, hookworm disease, and tuberculosis, and emergency relief of a million dollars has been contributed to the fund for European children. In addition, the Medical School in Peking has been maintained and aid given to thirty-one hospitals in China with the object of increasing their efficiency.

In the June issue of *Folk-lore* Mr. R. Grant Brown discusses the pre-Buddhist religion of the Burmese. It is not confined to the animistic beliefs which were possibly introduced with the so-called "corrupt" Mahayamist or northern form of Buddhism, which, to a far greater extent than the southern form which now prevails, incorporated the ancient beliefs and ceremonies of the people. The animism which now widely prevails is quite apart from Buddhism, and though Burmese Buddhism is in one sense only a veneer over the prevailing animism, it is not more superficial than the state of belief even in Western countries. It is frowned upon by the monks, yet not only do the votaries of the orthodox creed refrain from persecuting the beliefs and practices of the lower orders, but also both forms prevail even among the same individuals. A good example of this form of worship is that of the Nats, spirits of mountain, whirlpool, tree, earth or sky, rain or wind, and a hundred other things. Human sacrifice is still found in the Chindwin district, when a boy or a girl of a distant village is annually sacrificed and the blood sprinkled on the seed-rice. Cannibalism, in the sacramental form, appears in the case of a rebel leader who had been a monk and a reputed sorcerer; he was killed, his body dug up, and the flesh boiled down into a potent decoction. Mr. Brown's account of these and similar practices is interesting for comparison with customs of the same class prevalent in the lower cultures of some tribes in the Indian Peninsula.

The Pennsylvania University Museum has recently acquired a copy of a rare book, "A Catalogue of Specimens of Tapa or Bark Cloth," illustrated with samples of the cloth collected by Capt. Cook during his three voyages. The book was published in London in 1787, and contains, besides the catalogue and specimens of tapa, "A Particular Account of the Manner of Manufacturing the same in the various Islands of the South Seas: partly extracted from Mr. Anderson and Reinhold Forster's Observations, and the verbal Account of some of the most Knowing of the Navigators: with some Anecdotes that happened to them among the Natives." The list describes thirty-nine specimens, whilst this copy contains forty-three, four samples having apparently been added since the book was originally published. The *Museum Journal* for March, 1921, reprints the catalogue, with useful notes and descriptions of the method of preparing tapa cloth.

"The *Rôle* of Meteorology in Malaria" is the subject of a paper by Brevet Lt.-Col. C. A. Gill (*Indian Journ. Med. Research,* vol. viii., No. 4, 1921, p. 633). Col. Gill finds that whilst humidity exercises no direct effect on the malaria parasite in the mosquito, the survival of infected insects during and beyond the incubation period of the parasite in its insect-host is dependent upon the occurrence of certain favourable degrees of relative humidity over a wide range of temperature. On the other hand, the completion of the developmental stage of the parasite in the mosquito is determined by the association of relatively high temperature with relatively high humidity. The meteorological circumstances favourable to mosquito life and to the transmission of infection are thus not identical, and no relationship need, therefore, exist between the distribution of the carrier insect—the mosquito—in Nature and the distribution of endemic malaria.

Dr. R. J. Tillyard deals with the Neuropteroid insects of the Hot Springs region of New Zealand in relation to the problem of trout-food in vol. iii. of the *New Zealand Journal of Science and Technology* (Nos. 5 and 6, 1921). Observations made in various parts of the world, as well as in other regions of New Zealand, show that the larvæ of caddis-flies form one of the most important foods for the trout. In the district under consideration Dr. Tillyard states that the depredation caused by excess numbers of trout has enormously reduced the original fauna of these and other Neuropteroid insects which serve as food for this fish. In fact, the present position of the trout-fisheries in the Hot Springs region is such that there is not enough food for the trout present. It is clear that improvements can be effected along two distinct lines, viz. improvement of the food-supply and reduction in the number of trout. A series of recommendations is made by Dr. Tillyard in order to achieve this end.

The annual report of the Gresham's School Natural History Society for 1920 is an interesting and valuable record of the work done by a school society which is active and keenly alive to the importance of regional survey work. There are records of plants new to the district round Holt, of the insects collected by various members, of astronomical phenomena observed at the school, and of the first appearance of migratory birds in the neighbourhood. The most interesting record among insects is that of the first fully winged specimen of the Hemipteron, *Nabis boöps*, ever taken in Britain, captured by G. E. Hutchinson at Tidworth Pennings. One of the members, C. E. G. Bailey, has perfected and patented a self-tuning wireless apparatus which should prove valuable in expediting the work of wireless operators in synchronising their apparatus to that of the transmitting section.

BULLETIN 702 of the United States Geological Survey contains information on the oil possibilities in and around Baxter Basin, Rock Springs Uplift, Wyoming, and is the work of A. R. Schultz. Little work has hitherto been carried out in this area, although geologically it has long been favoured as a likely field, but latterly active interest has been taken in its development, and consequently the presentation of this official report is of much importance. The Rock Springs Uplift consists of an enormous dome of Cretaceous and Tertiary strata rising in the middle of the horizontally bedded rocks of the well-known Green River Basin, the dome itself being much warped into minor folds; Baxter Basin is situate in the central part of this dome, and consists structurally of a broad eroded anticlinal involving the Mesaverde, Blair, Baxter, Frontier, and Aspen series (in descending order) of Upper Cretaceous age, with probable representatives of much older formations. Oil occurs at several horizons, but the Frontier series, the principal oil-bearing series in Wyoming, lies at a depth of some 5000 ft. below the surface, which is almost the limit here for drilling. In addition, there are the extensive deposits of oil shale, the Green River formation of Tertiary age, surrounding the central area of the Rock Springs dome, and development of these should prove successful. Recent drilling on the Baxter Basin anticline has been carried out with promising results, mainly by three companies, small quantities of oil and a flow of gas at several hundred pounds pressure being obtained. This is a field of which we shall undoubtedly hear more in the course of time, and the Geological Survey officers are to be congratulated on the large amount of valuable preliminary information here published as an aid to its development.

IN Bulletin 713 of the U.S. Geological Survey (1920) there is an illustration of a recumbent cedar in vigorous growth, a member of a grove of similar habit on a wind-swept slope in Idaho. Physiographers and students of forestry will like to compare it with the drawing of *Pinus montana* in its climbing attitude in Brunhies's "Le Parc National Suisse" (NATURE, vol. cvi., p. 466).

WE have recently received a copy of part 3, vol. xl., Mem. Geol. Surv. India, by E. H. Pascoe, dealing with the occurrences of petroleum in the Punjab and North-West Frontier Province, which, though somewhat belated owing to the war and other circumstances, makes a welcome appearance just when first-hand information concerning our Imperial oil resources is required. The main petroliferous region occupies a belt flanking the Himalayas and traceable westwards from Simla, though it is not clearly defined until the division of Rawal Pindi is reached; it extends for 140 miles across the Indus through Kohat and Bannu and southwards into Baluchistan. The altitude of this belt suggests relationship to two distinct systems of tectonic movement: that of the Himalayas to the east, with their north-west to south-east trend in this region, and that of the Afghanistan-Baluchistan system to the west, a somewhat complex series of tectonic elements with a general curving strike from north to west, here recognised as 'the Attock arc. The belt lies in the re-entrant between these two systems, and occupies the site of an ancient river valley (Indobrahm), much in the same way as the petroliferous belts of Burma and Assam are coincident with ancient river-courses. Geologically the belt is divisible into halves, a northern and a southern, separated by a broad synclinal area. The northern half embraces the occurrences of oil around Rawal Pindi, in the Kala Chitta Hills, at Khaur, and in the trans-Indus salt area; the southern includes those of the salt range with the seepages of the Khasor Hills. Structurally the oil and gas are associated with anticlines involving rocks of Nummulitic or Muree age, the trend of these anticlines conforming to the main tectonic features existent at the particular locality at which they occur. Although the occurrence of petroleum in this part of India has been known of for many years, exploration has not met with unqualified success save in the case of the Attock Oil Co., which has carried out developments at Khaur. The oil obtained at Khaur varies in specific gravity from 0·894 to 0·876 in the upper sands, and from 0·877 to 0·840 in deeper sands, and is generally darker in colour than Burmese oil. The author regards the origin of the oil in this region as doubtful, though it would seem to be indigenous to the Nummulitic beds, its occurrence in the overlying Muree beds being probably due to upward migration.

THE subject of climatic conditions on the principal air routes in the East Indian Archipelago has been recently dealt with by Dr. C. Braak, of Batavia. Dr. Braak is of opinion that from an international point of view the air route from Singapore to Port Darwin is the most important. Relative to the different conditions in the tropics and in temperate latitudes, he asserts that in the tropics higher temperature at the surface is responsible for lighter air for aeroplanes at the start, but the wind conditions are said to be strongly in favour of the tropical climate. Cyclones are rare in the Archipelago, their occurrence being limited to the month of April and to the late days of March and early days of May, whilst there is usually only one in each year. The variability of wind direction is relatively small, and the wind variations are principally reinforcements and weakenings of the monsoons. A feature favourable to aerial navigation is stated to be the well-marked and very regular daily variation in most of the meteorological factors, so that choice can be made of the time of day that affords the best flying conditions. Details are given of the surface winds, as well as of the air movement in the higher levels. Monthly rain measurements and the number of rainy days are tabulated for many places within the area. The distribution of rainfall over the day is shown, as are also frequency of thunder, relative cloudiness, and haziness. It is stated that when comparison is made with the climatic conditions in temperate latitudes the conditions in the Archipelago may be called rather favourable.

IN the Bulletin of the Central Meteorological Observatory of Japan (vol. iii., No. 3, Tokyo, 1921)

Sin-iti Kunitomi and Hikotarô Takô discuss the correlation between the fluctuation of solar activity, as shown by sun-spots and faculæ, and the terrestrial precipitation of rain, as measured at Tokyo and other stations in Japan and Japanese territory elsewhere. The Greenwich records were drawn on for the solar data, and the periodogram method was applied to these and to the rainfall statistics. The investigation suffers from the paucity of the latter material, which is limited to a period of three years; the authors state that only when the influence on the rainfall, of other than solar causes, was eliminated by the periodogram treatment was it possible to obtain any significant correlation coefficients at all. Even so, they suggest that the relation between the solar activity and the precipitation is likely to be somewhat indirect. To the reader acquainted with studies of this kind it will probably appear that the amount of material used was inadequate to allow of even the most tentative conclusions being based upon it. The authors recognise the necessity for further discussion, and promise a more elaborate study of the subject later.

The August issue of the *Philosophical Magazine* contains the concluding portion of Dr. N. R. Campbell's paper on the disappearance of gas when an electric discharge is passed through more or less exhausted tubes, a subject he has investigated for the General Electric Co. His observations cast serious doubt on the results which have been obtained by many previous workers, according to whom Faraday's laws of electrolysis hold in gases. Dr. Campbell finds, on the contrary, that the current arriving at the electrodes is not related in any simple way to the ionisation and recombination—that is, to the chemical reaction—taking place in the gas. The current, for example, at the cathode is made up of positive ions arriving and electrons leaving, and while the latter process is closely connected with the former, the two processes are not likely to be connected with the rate of progress of the reaction in the gas in the same way.

After an interval of seven years the Geological Society of London has been able to resume the issue of its annual index to "Geological Literature Added to the Geological Society's Library," which is so complete a work of reference, both to subjects and to the output of individual authors. The present part (5*s*.) brings the matter down to the close of 1913.

Our Astronomical Column.

The August Meteoric Display.—Mr. W. F. Denning writes that on August 8 several fine meteors were observed by him at Bristol, and they belonged to the well-known shower of Perseids. On August 11, watching for two and a quarter hours before midnight, he counted 134 meteors, although the moon in her first quarter was shining brightly nearly all the time. The display was an exceptional one as regards both the number and the brightness of the meteors. Of the total number seen, 122 were Perseids and 12 belonged to the minor showers of the period. The radiant point of the Perseids was at 44°+57°, but it was not so sharply defined as it sometimes is.

About 33 of the meteors seen were equal to, or brighter than, stars of the first magnitude, and they exhibited the swift motions and luminous streaks which are characteristic of the August meteor swarm.

Clouds came over the sky at 11.50 G.M.T. and prevented observations in the morning hours, but there probably occurred a very rich exhibition of meteors at places where the stars were visible. On August 12 the firmament was partly cloudy at Bristol, but there was a considerable number of meteors to be observed, for in clear spaces they were frequently seen, though no continuous observations were made. At 2.30 a.m., G.M.T., four Perseids were seen in less than two minutes, but immediately afterwards clouds interfered.

Mr. C. P. Adamson, of Wimborne, Dorset, watched the sky during two and a quarter hours on the evening of August 11, and counted 131 meteors. His results, therefore, as regards the numerical strength of the shower are in close agreement with those obtained at Bristol. Mr. Adamson found the radiant point elongated, from 43°+57° to 49°+58°. Of the total number of meteors seen he says there were 125 Perseids, and at least 50 per cent. were equal to, or brighter than, first-magnitude stars.

The Bright Object near the Sun.—Three of the five observers of this object, referred to in last week's issue, p. 759, were Prof. Campbell and his wife, and Prof. H. N. Russell, who is staying at the Lick Observatory. The object was seen shortly before sunset; the fact that it partook of the diurnal motion indicated that it was a celestial body. Prof. Campbell observed it with binoculars, and noted that it still appeared stellar, which favoured its being a nova. If so, it is probably the most brilliant since that of Tycho Brahe. The approximate position is R.A. 9h. 22m., N. decl. 16°. The galactic latitude is about 40°. The object does not appear to have been seen since August 7. It may be recalled that the great 1882 comet and that of January, 1910, were seen close to the sun.

A report from Königstuhl Observatory, near Heidelberg, states that on the night of August 8–9 a number of luminous bands lay across a clear sky from W.N.W. to E.S.E.; they moved slowly towards N.N.E., growing paler as the dawn came. It was conjectured that it might be the tail of the light object seen at Lick Observatory on August 7, passing very near the earth. It will be recalled that a somewhat similar phenomenon was reported when the earth passed through the tail of the great comet of 1861 on June 30 of that year.

It seems possible, however, that the present streamers may have been auroral, as the cometary nature of the Lick Observatory object is still in doubt.

Continuation of the Ephemeris of Eros.—This planet was photographed at the Algiers Observatory in July, within 3′ of the predicted position. The following ephemeris, for Greenwich midnight, is by Mr. F. E. Seagrave, corrected approximately by observation :—

		R A.			N. Decl.				R.A.			N. Decl	
		h.	m.	s.	°				h.	m.	s.	°	′
Aug.	20	23	25	41	12	20	Sept.	9	22	52	56	13	57
	24	23	20	18	12	52		13	22	45	22	13	57
	28	23	14	13	13	18		17	22	37	54	13	49
Sept.	1	23	7	32	13	38		21	22	30	44	13	35
	5	23	0	23	13	51		25	22	24	3	13	16

Values of log r, log Δ, August 20, 0·2249, 9·8676; September 25, 0·2026, 9·8064. The magnitude in mid-September will be 10·5. The planet will thus be easily accessible in ordinary telescopes. Accurate observations of position are desired